======= **WPI** =======

TI - Surface-mounted choke coil preventing unrequired EM radiation noise - has end of toroidal coil held in G=shaped holder which is lead to pin terminal through guide groove provided on holder NoAbstract

AB - J05299252
- (Dwg.1/5)

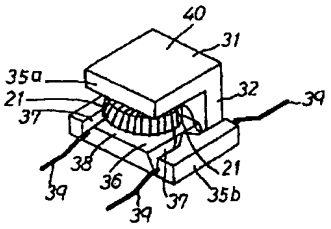
PN - JP5299252 A 19931112 DW199350 H01F17/06 004pp
PR - JP19920130131 19920422
PA - (TOHM ) TOKIN CORP
MC - V02-F03
DC - V02
IC - H01F15/10 ;H01F17/06 ;H01F27/02 ;H01F37/00 ;H01F41/08
AN - 1993-398521 [50]

======= **PAJ** =======

TI - SURFACE MOUNTING TYPE CHOKE COIL

AB - PURPOSE:To contrive a lowering in the attitude of a surface mounting type choke coil in a small packaging area by a method wherein a coil with a toroidal core having a winding executed thereon is housed in an open groove in an insulating case to pinch the coil by both of upper and lower pinching pieces and after the end parts of the winding are respectively bound on lead-out pin terminals through guide grooves and are soldered, the pin terminals are shaped in a surface packaging type.
- CONSTITUTION:Pin terminals 39 molded into a surface mounting type with an upper pinching part 35a, which consists of an electrical insulating material and is formed its upper surface into a flat surface, are planted, a coupling piece 32 for coupling a lower pinching part 35b provided with guide grooves 37 with the pinching part 35a is formed and an open groove 36 is formed between the pinching parts 35a and 35b. A toroidal coil 21 with a small-diameter core 22 having a winding executed thereon is inserted and fixed in the groove 36 in an insulating case 31 consisting of pinching pieces 38 provided on the inner walls, which are located in the groove 36, of the pinching parts 35a and 35b. The end parts of the winding on this coil 21 are respectively bound on the pin terminals 39 through the grooves 37 making their slants and faces have a roundness and are soldered to form a surface packaging type choke coil 40.

PN - JP5299252 A 19931112
PD - 1993-11-12
ABD - 19940215
ABV - 018091
AP - JP19920130131 19920422
GR - E1508
PA - TOKIN CORP
IN - TAKASAGO KATSUNORI
I - H01F17/06 ;H01F15/10 ;H01F27/02 ;H01F37/00 ;H01F41/08




**<First Page Image>**

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| | 27/02 | Ｚ | 7135－5Ｅ | | |
| | 37/00 | | 8935－5Ｅ | | |
| | 41/08 | Ｆ | 8019－5Ｅ | | |

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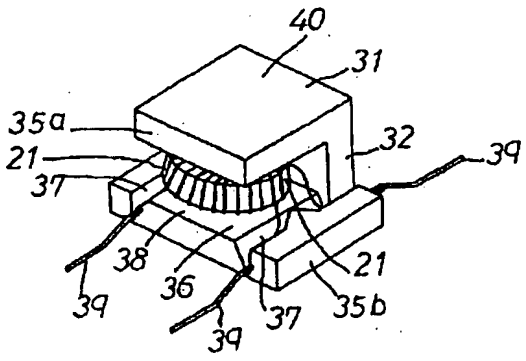
(54)【発明の名称】　面実装形チョークコイル

(57)【要約】

【目的】　小径トロイダルコアに巻線を施した小形チョークコイルを自動実装機により面実装可能な、かつ小実装面積で低姿勢化を可能にした面実装形チョークコイルとする。

【構成】　電気絶縁材料からなり上面が平坦面の上部狭持部３５ａと面実装形に成形したピン端子３９を植設しガイド溝３７を設けた下部狭持部３５ｂを連結する連結片３２と、上部狭持部と下部狭持部との間に形成された開口溝３６と、開口溝の上下狭持部の内壁に設けた狭持片３８からなる絶縁ケース３１に、小径トロイダルコイルに巻線を施したトロイダルコイル２１を開口溝に挿入固定し、トロイダルコイルの巻線端部を、傾斜と面に丸味をもたせたガイド溝を通しピン端子にからげ半田付して面実装形チョークコイルとする。



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【特許請求の範囲】

【請求項1】　小径トロイダルコアに被覆付絶縁銅線を巻線して絶縁ケースに収納して成る面実装形チョークコイルに於て、電気絶縁材料から成り断面コの字形の上面が平坦面の上部狭持部と下部狭持部と、上部狭持部と下部狭持部とを連結する連結片と、該連結片面を除きトロイダルコイルを収納する基板実装面に平行方向に設けられた開口溝を設け、上部狭持部は下部狭持部より小さく、上部狭持部と下部狭持部の対向内壁面には面よりわずかにつき出て設けられた狭持片と下部狭持部の両側面に植設された少なくとも1対のピン端子と、上部狭持部の幅寸法より外側に前記ピン端子根元に達するガイド溝を設けて形成した絶縁ケースと、該絶縁ケースの開口溝に小径トロイダルコアに巻線したトロイダルコイルを開口溝内に収納して上部狭持部、下部狭持部の対向内壁の狭持片により狭持し、巻線の端部を前記ガイド溝を通して引き出してピン端子にからげ、半田付けして接続した後、前記ピン端子を面実装型に整形し形成してなることを特徴とする面実装形チョークコイル。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、小形チョークコイルに係り、特にディジタル機器のプリント基板上に装着し、電子機器に於ける不要電磁輻射ノイズの防止に用いる自動実装機を用い基板上への実装が可能な面実装形チョークコイルに関する。

【0002】

【従来の技術】ディジタル機器などで取り扱う信号のディジタル化、高速化に伴い、信号ライン、電源ラインで発生、或は受信される不要電磁輻射ノイズによる信号の混信、誤動作への対応が重要な課題となっている。これらの対策としてプリント基板上に装着し、または、ディジタル機器間の信号線ケーブルにフェライトコアを貫通させたチョークコイルが用いられる。従来、この種の小形チョークコイルにあっては、図5に示すごとく、高い比透磁率特性を有するフェライト材より成る小径のトロイダルコア41に被覆付絶縁銅線42より成る信号線を前記トロイダルコアに巻線して、小形チョークコイル40を得ている。これらのチョークコイルはその巻線端部43の絶縁被覆を剥離する線処理をした後、直接プリント基板上に装着し、巻線端部43は半田パット44に半田付けし、小形チョークコイルは接着剤45で基板に固定し接続される。また、取り扱いの利便を図るため専用端子付ケースに一旦収納した上で、プリント基板上に装着し接続する小形チョークコイルもある。

【0003】

【発明が解決しようとする課題】従来、この種の小形チョークコイルにあっては、ディジタル機器などで取り扱う信号のディジタル化、高速化に伴うプリント基板の高密度実装化にあって、自動実装化、小スペース化、低姿

2

勢化など、電子部品をプリント基板へ実装する際の面実装（SMD）化への市場ニーズに充分応えることが出来ないという欠点を有していた。

【0004】

【課題を解決するための手段】本発明は、小径トロイダルコア（以下コアと称す）に被覆付絶縁銅線を巻線して成る小形チョークコイルを面実装型チョークコイルとするため、絶縁ケースは電気絶縁材からなる厚板の直方体をその四側面の一側面を上部狭持部下部、狭持部を連結する連結片とし、該連結片面を除いてその主面にトロイダルコイルを収納する側面がコの字形の、チョークコイル収納用の開口溝が基板実装面に対し平行に設けられ、上部狭持部と下部狭持部の対向内壁面に少なくとも対向する上部狭持部と下部狭持部の内面に1対の僅かに突出した狭持片を設けており、前記トロイダルコイルはコアの厚み方向で開口溝の上下の両狭持片により狭持される。上部狭持部は下部狭持部より巾狭で、上部狭持部の上面は平坦面を呈し、自動機を用いて基板上に実装する際容易に吸着パットにより着脱自在に出来る構造としてある。下部狭持部には連結片両側面と対向面端面に少なくとも1対のピン端子が植設され、上部狭持部の幅寸法より外側に前記ピン端子根元に達する傾斜をもたせ、巻線端部を無理なくピン端子に引き出すガイド溝を設けた絶縁ケースの構造である。絶縁ケースの開口溝に前記トロイダルコアに巻線したトロイダルコイルを収納し、開口溝の上下狭持部の両狭持片により狭持して、巻線の端部を前記ガイド溝を通じてピン端子にからげ、半田付接続した後、該ピン端子を簡単なプレス機械により整形することにより、その上面に自動機の吸着パットにより吸着出来る平坦面を有する自動実装可能な面実装形チョークコイルとする。

【0005】即ち本発明は、小径トロイダルコアに被覆付絶縁銅線を巻線して絶縁ケースに収納して成る面実装形チョークコイルに於て、電気絶縁材料から成り断面コの字形の上面が平坦面の上部狭持部と下部狭持部と、上部狭持部と下部狭持部を連結する連結片と、該連結片面を除きトロイダルコイルを収納する基板実装面に平行方向に設けられた開口溝を設け、上部狭持部は下部狭持部より小さく、上部狭持部と下部狭持部の対向内壁面には面よりわずかにつき出て設けられた狭持片と、下部狭持部の両側面に植設された少なくとも1対のピン端子と、上部狭持部の幅寸法より外側に前記ピン端子根元に達するガイド溝を設けて形成した絶縁ケースと、該絶縁ケースの開口溝に小径トロイダルコアに巻線したトロイダルコイルを開口溝内に収納して両狭持片により狭持し、巻線の端部を前記ガイド溝を通して引き出しピン端子にからげ、半田付けして接続した後、前記ピン端子を面実装型に整形し形成してなることを特徴とする面実装形チョークコイルである。

【0006】

3

【作用】断面U字型で一方が開口し連結片でつながる上面に平坦面を有する上部狭持部と下部狭持部と、上部狭持部と下部狭持部の内側対向内壁面にわずかに突出する狭持片と、下部狭持部の連結片をはさんでトロイダルコイルの巻線端部を引き出す面実装型のピン端子に接続するガイド溝を設け、ガイド溝の上面の巻線端部が接する面は丸味をもたせた形状であるので、小形トロイダルコイルの巻線端部は円滑にピン端子に引き出せ、樹脂モールドを必要とすることなく信頼性の高い上面が平坦面である上部狭持部の上面で自動実装機の吸着パットで着脱出来る自動実装が可能な小形トロイダルコイルを用いた面実装形チョークコイルとする。

【0007】

【実施例】図を用い本発明の面実装形チョークコイルの実施例につき説明する。図1は本発明による小形チョークコイルの一実施例であり、図2は本発明に用いるトロイダルコイルを示し、図3は本発明に用いる面実装用絶縁ケースを示し、図4は図3に示す本発明の面実装用絶縁ケースの断面図を示す。図3に示す絶縁ケース31は、電気絶縁材料からなる厚板の直方体を呈しており、その四側面の一側面を上部狭持部35a、下部狭持部35bを連結する連結片32と、上部狭持部35a、下部狭持部35b間に図2に示すトロイダルコイル21を収納する開口溝36が基板実装面と水平方向に設けられ、前記トロイダルコイル21はトロイダルコアの厚み寸法は上部狭持部35a、下部保持部35bの内壁に取り付けた狭持片38の間隔とほぼ同じ寸法に作られているのでトロイダルコイル21は開口溝36内で対向する狭持片38により狭持され、トロイダルコイルの巻線端部24をガイド溝37を通してピン端子にからげ半田付けし、本考案の面実装形チョークコイルとする。本考案の面実装形チョークコイルでは、開口溝36の開口高さ寸法をトロイダルコイル21の表裏面と収納用開口溝の両内壁面の狭持片38とが接する様、寸法を選び、さらに開口溝の両上下内壁面に僅かに突出した狭持片38を設けてあるので、絶縁ケース31とトロイダルコイル21とを接着剤等を用いて固着しなくても、小形チョークコイルをどのような姿勢にしてもトロイダルコイルが絶縁ケース31から飛び出すことはない。上部狭持部35aは下部狭持部35bより小さく、上部狭持部の上面は平坦面を有し、自動実装機の吸着パットに容易に吸着できるよう形成してある。図1に於て、絶縁ケースの下部狭持部35bには両側面に少なくとも1対のピン端子39（例えば直径が0．6mmの断面丸形、又は巾1．0mm、厚板0．3mm）が植設され、上部狭持部の幅寸法より外側に、前記ピン端子39の根元に達する巻線材の太さを収納するに充分な深さ、かつ、前記ピン端子39の根元に向かって適度の傾斜角度と丸味を形成したガイド溝37を設けた絶縁ケースである。

【0008】次に本発明の面実装形チョークコイルの製

4

造工程を説明する。

①巻線工程

図2に示すN1－Zn系小径トロイダルコア22に被覆付絶縁銅線25により巻線23を施して図2に示すようなトロイダルコイル21を得る。例えばトロイダルコアの外径はφ4mm、巻線の線径がφ0．1mm単線あるいは平行線などを用いる。

②組立工程

絶縁ケース31の収納用の開口溝36内に巻線工程で作られたトロイダルコイル21を収納用の開口溝にはめ込むことにより両内壁面に僅かに突出した両狭持片38により狭持される。トロイダルコイルの巻線端部24を開口溝からケースの外へガイド溝37を通じて引出し、ピン端子39の根元にからげる。

③半田付工程

半田付けは前記絶縁ケース31の一方のピン端子39を専用治具（例えばマグネットなどによる吸着、バネ力によるクランプなど）に数個一括し保持した上、溶融半田槽内に数秒間浸漬し、巻線端部の絶縁被覆を熱剥離すると同時にピン端子に半田付け接続する。

④フォーミング工程

ピン端子39は例えばガルウィング形状に端子成形するものにあっては、プレス金型の構造はケース保持部、端子押え部、端子曲げ部などをバネカで保持する比較的簡単な金型で端子曲げ、端子切断を一動作工程内で加工する。

⑤検査工程

インダクタンス、直流抵抗などの電気検査、端子の曲げ寸法など検査を行い、性能を確認する。

【0009】

【発明の効果】本発明は、小径トロイダルコアに被覆付絶縁銅線を巻線して成る小形チョークコイルに於て、絶縁ケースは、電気絶縁材料から成る厚板の直方体であり、その四側面の一側面を上部狭持部、下部狭持部を連結する連結片とし、該連結片面を除いてその主面にトロイダルコイルを収納する開口溝が実装面と平行方向に設けられ、前記トロイダルコイルはコアの厚み方向に開口溝の上部狭持部、下部狭持部により狭持される。上部狭持部は下部狭持部より小さく、上面は平坦である。下部狭持部には両側面に少なくとも1対のピン端子が植設され、上部狭持部の幅寸法より外側に前記ピン端子根元に達するガイド溝を設けたケース構造である。絶縁ケースの開口溝に前記トロイダルコアに巻線したトロイダルコイルを収納し、開口溝の上下の狭持片により狭持し、巻線の端部を前記開口溝よりガイド溝を通じて引出しピン端子にからげ、半田付接続した後、該ピン端子を簡単なプレス機械により整形することにより、上面に自動チップマウンタなどの自動実装機械により吸着する吸着パットが装着できる上平面を有し、又、トロイダルコイルは充填樹脂などにより封止成形していないことから、小形

5

チョークコイルの磁気特性を損なうことがない故、高品質で自動実装可能な面実装型チョークコイルを得る。

【図面の簡単な説明】

【図1】本発明による小形チョークコイルの外観斜視図。

【図2】本発明の面実装型チョークコイルに用いるトロイダルコイルの外観斜視図。

【図3】本発明に用いる面実装用絶縁ケースの外観斜視図。

【図4】図3に示す絶縁ケースのガイド溝部分の断面図。

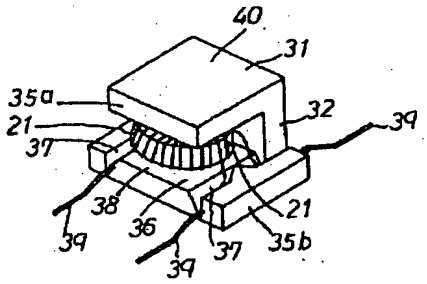
【図5】従来の小形チョークコイルを示す斜視図。

【符号の説明】

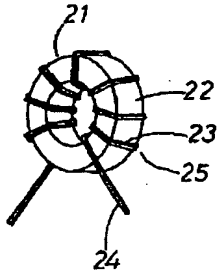
| | |
|---|---|
| 21 | トロイダルコイル |
| 22，41 | トロイダルコア |
| 23 | 巻線 |
| 24，43 | 巻線端部 |
| 25，42 | 被覆付絶縁銅線 |
| 31 | 絶縁ケース |
| 32 | 連絡片 |
| 33 | 上平面 |
| 35a | 上部挟持部 |
| 35b | 下部挟持部 |
| 36 | 開口溝 |
| 37 | ガイド溝 |
| 38 | 挟持片 |
| 39 | ピン端子 |
| 40 | 小形チョークコイル |
| 44 | 半田パット |
| 45 | 接着剤 |

6

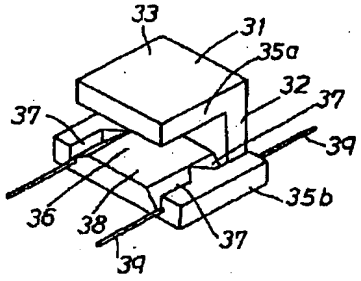
【図1】




【図2】




【図3】

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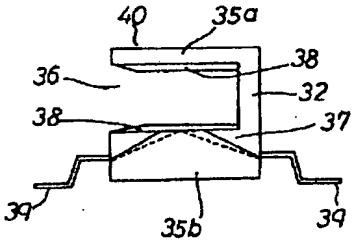


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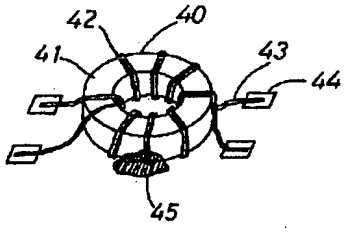

JP,05-299252,A

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CLAIMS

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[Claim(s)]
[Claim 1] The coil of the insulation copper wire with covering is carried out to a minor diameter toroidal core, and it consists of an electrical insulation material in the surface mounting form choke coil which contains and grows into an insulating case. the upper surface of the typeface of cross-section KO Up ****** and lower ****** of a flat side, The opening slot prepared to the piece of connection which connects up ****** and lower ******, and the substrate component side which contains a toroidal coil except for this connection one side in parallel is prepared. At least one pair of pin terminals implanted in the both-sides side of the piece of ****, and lower ****** which was smaller than lower ****** as for up ******, took lessons from the opposite internal surface of up ****** and lower ****** more slightly than a field, came out, and was established, The insulating case which prepared and formed the guide slot which reaches the aforementioned pin terminal root outside the width-of-face size of up ******, The toroidal coil which carried out the coil to the minor diameter toroidal core in the opening slot of this insulating case is contained to opening Mizouchi. Up ******, The surface mounting form choke coil which **** by the piece of **** of the opposite wall of lower ******, pulls out the edge of a coil through the aforementioned guide slot, operates orthopedically and forms the aforementioned pin terminal in a surface mounting type after tucking up to a pin terminal, soldering to it and connecting with it, and is characterized by the bird clapper.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]
[Industrial Application] this invention relates to a small choke coil, especially it equips with it on the printed circuit board of a digital device, and it can be set on electronic equipment -- unnecessary -- electromagnetism -- it is related with the surface mounting form choke coil in which mounting of a up to [ a substrate ] is possible using the automatic mounting machine used for prevention of a radiation noise
[0002]
[Description of the Prior Art] it follows on digitization of the signal dealt with by the digital device etc., and improvement in the speed, and is generated or received with a signal line and a power supply line -- unnecessary -- electromagnetism -- interference of the signal by the radiation noise and the correspondence to a malfunction have been an important technical problem The choke coil which it equipped [ choke coil ] on the printed circuit board as these cures, or made the signal-line cable between digital devices penetrate a ferrite core is used. If it is in this kind of small choke coil conventionally, as shown in drawing 5 , the coil of the signal line which changes from the insulation copper wire 42 with covering to the toroidal core 41 of the minor diameter which consists of the ferrite material which has a high relative permeability property was carried out to the aforementioned toroidal core, and the small choke coil 40 has been obtained. After these choke coils carry out line processing which exfoliates the pre-insulation of the coil edge 43, it equips with them on a direct printed circuit board, and the coil edge 43 is soldered to Pat Handa 44, and a small choke coil is fixed and connected to a substrate with adhesives 45. Moreover, there is also a small choke coil which equips on a printed circuit board and connects after once containing in a case with an exclusive terminal, in order to give facilities to handling.
[0003]
[Problem(s) to be Solved by the Invention] If it was in this kind of small choke coil conventionally, it is in digitization of the signal dealt with by the digital device etc., and high-density-assembly-ization of the printed circuit board accompanying improvement in the speed, and had the fault that it could not respond to the commercial-scene needs for surface-mounting(SMD )-izing at the time of mounting electronic parts to a printed circuit board, such as formation of automatic mounting, formation of a small space, and low-profile-izing, enough.
[0004]
[Means for Solving the Problem] In order that this invention may use as a surface mounting type choke coil the small choke coil which carries out the coil of the insulation copper wire with covering to a minor diameter toroidal core (a core is called below), and grows into it, An insulating case the unilateral side of the 4 sides for the rectangular parallelepiped of the thick plate which consists of electric insulation material The up **** subordinate section, The side which considers as the piece of connection which connects ******, and contains a toroidal coil to the principal plane except for this connection one side The typeface of KO, The opening slot for choke coil receipt is prepared in parallel to a substrate component side. One pair of pieces of **** projected slightly are prepared in the inside of up ******, up ****** which counters the opposite internal surface of lower ****** at least, and lower ******, and the aforementioned toroidal coil is ****(ed) in the thickness direction of a core by the piece of both **** of the upper and lower sides of an opening slot. Up ****** is narrowness from lower ******, and the upper surface of up ****** presents a flat side, and in case it mounts on a substrate using an automatic machine, it has made it the structure which can make attachment and detachment free by adsorption putt easily. It is the structure of an insulating case where the guide slot which at least one pair of pin terminals are implanted in lower ****** at the piece both-sides side of connection and an opposed face end face, gives the inclination which reaches outside the width-of-face size of up ****** at the aforementioned pin terminal root, and pulls out a coil edge to a pin terminal reasonable was prepared. The toroidal coil which carried out the coil to the aforementioned toroidal core is contained into the opening slot of an insulating case, and it **** by the piece of both **** of

vertical ****** of an opening slot, the edge of a coil is tucked up to a pin terminal through the aforementioned guide slot, and after making soldering connection, it carries out by operating this pin terminal orthopedically by the easy press machine as the surface mounting form choke coil which has the flat side which can stick to the upper surface by the adsorption putt of an automatic machine and which can

[0005] this invention carries out the coil of the insulation copper wire with covering to a minor diameter toroidal core, and it consists of an electrical insulation material in the surface mounting form choke coil which contains and grows into an insulating case. the upper surface of the typeface of cross-section KO Namely, up ****** and lower ****** of a flat side, The opening slot prepared to the piece of connection which connects up ****** and lower ******, and the substrate component side which contains a toroidal coil except for this connection one side in parallel is prepared. The piece of **** which was smaller than lower ****** as for up ******, took lessons from the opposite internal surface of up ****** and lower ****** more slightly than a field, came out, and was prepared, At least one pair of pin terminals implanted in the both-sides side of lower ******, and the insulating case which prepared and formed the guide slot which reaches the aforementioned pin terminal root outside the width-of-face size of up ******, Contain the toroidal coil which carried out the coil to the minor diameter toroidal core in the opening slot of this insulating case to opening Mizouchi, and it **** by the piece of both ****. It is the surface mounting form choke coil which pulls out the edge of a coil through the aforementioned guide slot, operates orthopedically and forms the aforementioned pin terminal in a surface mounting type after tucking up to a pin terminal, soldering to it and connecting with it, and is characterized by the bird clapper.

[0006]

[Function] Up ****** and lower ****** which have a flat side on the upper surface which one side carries out opening with cross-section the type of U characters, and is connected in the piece of connection, The piece of **** which projects slightly in the inside opposite internal surface of up ****** and lower ******, Since the field where the guide slot linked to the surface mounting type pin terminal which pulls out the coil edge of a toroidal coil on both sides of the piece of connection of lower ****** is prepared, and the coil edge of the upper surface of a guide slot touches is the configuration where roundness was given The coil edge of a small toroidal coil can be smoothly pulled out to a pin terminal. It considers as the surface mounting form choke coil using the small toroidal coil in which automatic mounting which can be detached and attached in the adsorption putt of an automatic mounting machine on the upper surface of up ****** whose reliable upper surface is a flat side is possible, without needing a resin mould.

[0007]

[Example] It explains per example of the surface mounting form choke coil of this invention using drawing. Drawing 1 is one example of the small choke coil by this invention, drawing 2 shows the toroidal coil used for this invention, drawing 3 shows the insulating case for surface mounting used for this invention, and drawing 4 shows the cross section of the insulating case for surface mounting of this invention shown in drawing 3 . The piece 32 of connection which the insulating case 31 shown in drawing 3 is presenting the rectangular parallelepiped of the thick plate which consists of an electrical insulation material, and connects up ******35a and lower ****** 35b for the unilateral side of the 4 sides, The opening slot 36 which contains the toroidal coil 21 shown in drawing 2 between up ******35a and lower ****** 35b is established in a substrate component side and a horizontal direction. The aforementioned toroidal coil 21 the thickness size of a toroidal core Up ******35a, Since it is made by the almost same size as the interval of the piece 38 of **** attached in the wall of lower attaching part 35b, a toroidal coil 21 is ****(ed) by the piece 38 of **** which counters in the opening slot 36. The coil edge 24 of a toroidal coil is tucked up and soldered to a pin terminal through the guide slot 37, and it considers as the surface mounting form choke coil of this design. The appearance which the piece 38 of **** of the front rear face of a

toroidal coil 21 and both the internal surfaces of the opening slot for receipt touches in the opening height size of the opening slot 36 in the surface mounting form choke coil of this design, Since a size is chosen and the piece 38 of **** projected slightly is further formed in both the vertical internal surface of an opening slot Even if it does not fix the insulating case 31 and a toroidal coil 21 using adhesives etc., no matter it may make a small choke coil into what posture, a toroidal coil does not jump out of the insulating case 31. Up ****** 35a is smaller than lower ****** 35b, and the upper surface of up ****** has a flat side, and it has formed it so that it can stick to the adsorption putt of an automatic mounting machine easily. in drawing 4 -- lower ******35b of an insulating case -- a both-sides side -- at least one pair of pin terminals 39 (for example, the cross-section round shape whose diameter is 0.6mm --) A width of 1.0mm and 0.3mm of thick plates are implanted. or outside the width-of-face size of up ****** It is the insulating case which formed sufficient depth to contain the size of the coil material which reaches the root of the aforementioned pin terminal 39, and the guide slot 37 which formed the moderate degree of tilt angle and moderate roundness toward the root of the aforementioned pin terminal 39.

[0008] Next, the manufacturing process of the surface mounting form choke coil of this invention is explained.

** Obtain the toroidal coil 21 as given a coil 23 to the nickel-Zn system minor diameter toroidal core 22 shown in the coil process drawing 2 with the insulation copper wire 25 with covering and shown in drawing 2 . For example, as for the outer diameter of a toroidal core, the wire size of phi4mm and a coil uses phi0.1mm single track or parallel lines.

** an erector inserts in the opening slot for receipt the toroidal coil 21 made from the coil process in the opening slot 36 for receipt of the insulating case 31 -- both internal surfaces -- small -- a protrusion -- the piece 38 of both **** **** the bottom The coil edge 24 of a toroidal coil is pulled out through the guide slot 37 out of a case from an opening slot, and it tucks up at the root of a pin terminal 39.

** Soldering process soldering is immersed for several seconds in a melting solder tub, after one pin terminal 39 of the aforementioned insulating case 31 was partly put in block to exclusive fixtures (for example, adsorption with a magnet etc., the clamp by the spring force, etc.) and holding it to them, and make soldering connection of it at a pin terminal at the same time it carries out heat ablation of the pre-insulation of a coil edge.

** if the foaming process pin terminal 39 is for example, in a gal wing configuration at some which carry out terminal fabrication -- a press -- the structure of metal mold processes terminal bending and terminal cutting within 1 operation process with the comparatively easy metal mold which holds a case attaching part, the terminal presser-foot section, the terminal bending section, etc. by the spring force

** Conduct inspection, such as an electric inspection of an inspection process inductance, direct current resistance, etc., and a bending size of a terminal, and check a performance.

[0009]

[Effect of the Invention] this invention in the small choke coil which carries out the coil of the insulation copper wire with covering to a minor diameter toroidal core, and grows into it an insulating case It is the rectangular parallelepiped of the thick plate which consists of an electrical insulation material. the unilateral side of the 4 sides Up ******, It considers as the piece of connection which connects lower ******, the opening slot which contains a toroidal coil to the principal plane except for this connection one side is established in a component side and a parallel direction, and the aforementioned toroidal coil is ****(ed) by up ****** of an opening slot, and lower ****** in the thickness direction of a core. Up ****** is smaller than lower ******, and the upper surface is flat. It is the case structure which prepared the guide slot which at least one pair of pin terminals are implanted in a both-sides side at lower ******, and reaches outside the width-of-face size of up ****** at the aforementioned pin terminal root. The toroidal coil which carried out the coil to the aforementioned toroidal core is contained into the opening slot of an insulating case.

**** by the piece of **** of the upper and lower sides of an opening slot, pull out the edge of a coil through a guide slot from the aforementioned opening slot, tuck up to a pin terminal, and after making soldering connection, by operating this pin terminal orthopedically by the easy press machine It has the Kamitaira side which can equip the upper surface with the adsorption putt to which it sticks with automatic mounting machines, such as an automatic chip mounter. Moreover, since the toroidal coil has not carried out closure fabrication with a restoration resin etc., it obtains the reason and being quality and the surface mounting type choke coil which can be mounted automatically which does not spoil the magnetic properties of a small choke coil.

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[Translation done.]
* NOTICES *



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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1] The appearance perspective diagram of the small choke coil by this invention.
[Drawing 2] The appearance perspective diagram of the toroidal coil used for the surface mounting type choke coil of this invention.
[Drawing 3] The appearance perspective diagram of the insulating case for surface mounting used for this invention.
[Drawing 4] The cross section for a guide slot of the insulating case shown in drawing 3 .
[Drawing 5] The perspective diagram showing the conventional small choke coil.
[Description of Notations]
21 Toroidal Coil
22 41 Toroidal core
23 Coil
24 43 Coil edge
25 42 Insulation copper wire with covering
31 Insulating Case
32 Piece of Connection
33 Kamitaira Side
35a Up ******
35b Lower ******
36 Opening Slot
37 Guide Slot
38 Piece of ****
39 Pin Terminal
40 Small Choke Coil
44 Pat Handa
45 Adhesives

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[Translation done.]